

Operational Grid tools developed at SCL



www.see-grid-sci.eu

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- gLite represents one of the major middleware stacks used today
- Installation, maintenance and everyday Grid operations of a successful gLite resource center (Grid site) are not an easy task
- Site administrators are responsible for:
 - Maintaining committed Grid resources available to supported user communities
 - Resolving all operational problems identified by the deployed monitoring tools or diagnosed by the users
- Site administrators usually deploy customized or home-made tools
- SCL has developed several useful tools and scripts for managing a gLite-based Grid site



- Intended to simplify the management of medium or large computer clusters:
 - execute the same command on all nodes
 - distribute files on many nodes in an automated way
- The configuration file `scl-nodes` is a list of fully qualified domain names (FQDN)
- Five execution scripts:
 - `scl-ssh` – Generates private and public keys and exchanges public keys among the nodes
 - `scl-exec` – Executes a specified command using SSH on all nodes listed in `scl-nodes`
 - `scl-scp` – Copies a specified file to all nodes listed in the `scl-nodes` configuration file using secure copy
 - `scl-pull` and `scl-push` – Designed to copy different files to or from nodes



■ Examples:

```
[root@ce-atlas ~]# scl-exec date
```

```
wn01.ipb.ac.rs:
```

```
Tue Nov 10 13:23:15 CET 2009
```

```
wn02.ipb.ac.rs:
```

```
Tue Nov 10 13:23:15 CET 2009
```

- It is possible to run more than one command in the line using the quotes (“”):

```
[root@ce-atlas ~]# scl-exec "cat /var/log/messages | grep error"
```

- File manipulation:

```
[root@ce-atlas ~]# scl-scp site-info.def /root/
```

```
site-info.def 100% 21KB 20.8KB/s 00:00
```

```
site-info.def 100% 21KB 20.8KB/s 00:00
```

```
[root@ce~]#scl-push /root/nodes-network/ /etc/sysconfig/network
```

```
[root@ce~]#scl-pull /etc/sysconfig/network /root/node-network/
```

- **scl-scripts can be easily modified to handle more than one group of nodes**



- Command-line tool
- Provides information on local VOMS mapping of users authenticated by digital certificates on various Grid services
- To find which username corresponds to which subject and vice versa gFinger searches `/etc/gridsecurity/gridmapdir` directory for links pointing to the same inode



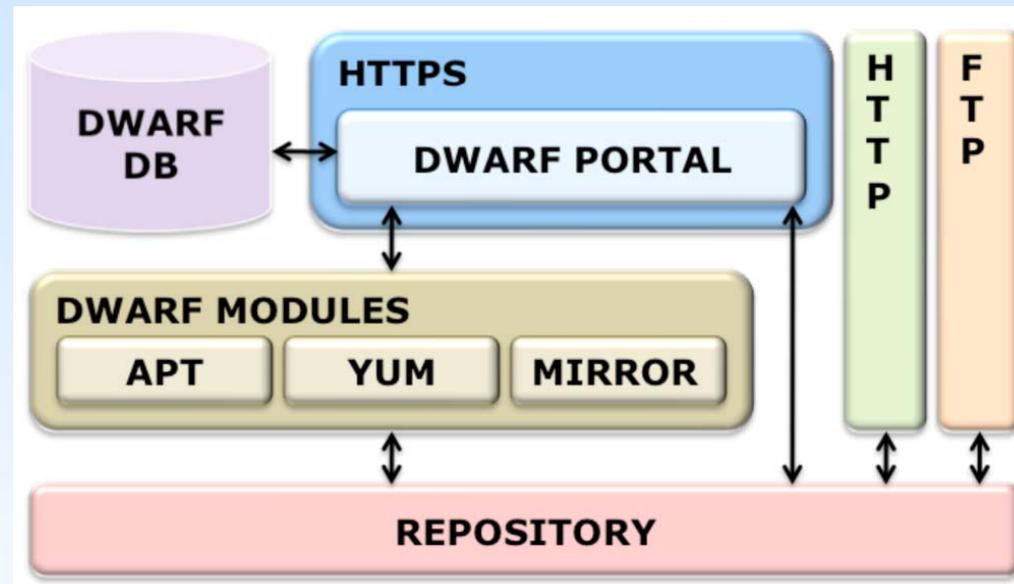
■ Example:

```
[root@wms ~]# gfinger vudragovic  
DN: /c=rs/o=aegis/ou=institute of physics belgrade/cn=dusan  
vudragovic:atlas:atlas  
Login: atlas001 Name: mapped user for group ID atlas  
Directory: /home/atlas001 Shell: /bin/bash  
User ID: 20001 Group ID: 2000
```

```
[root@wms ~]# gfinger seevo002  
DN: /c=rs/o=aegis/ou=institute of physics belgrade/cn=aleksandar  
bogojevic:seevo  
Login: seevo002 Name: mapped user for group ID seevo  
Directory: /home/seevo002 Shell: /bin/bash  
User ID: 23002 Group ID: 2300
```

- Useful when individual user have to be tracked in Grid services related problems

- Framework used for authorized Advanced Packaging Tool (APT) and Yellow dog Updater Modified (YUM) repositories management
- DWARF allows uploading of RPM packages and creation of APT and YUM repositories
- Authentication and authorization based on digital certificates using Public Key Infrastructure (PKI)
- From the DWARF web portal authenticated and authorized user can:
 - Create and change repository structure
 - Package uploading
 - Build repository



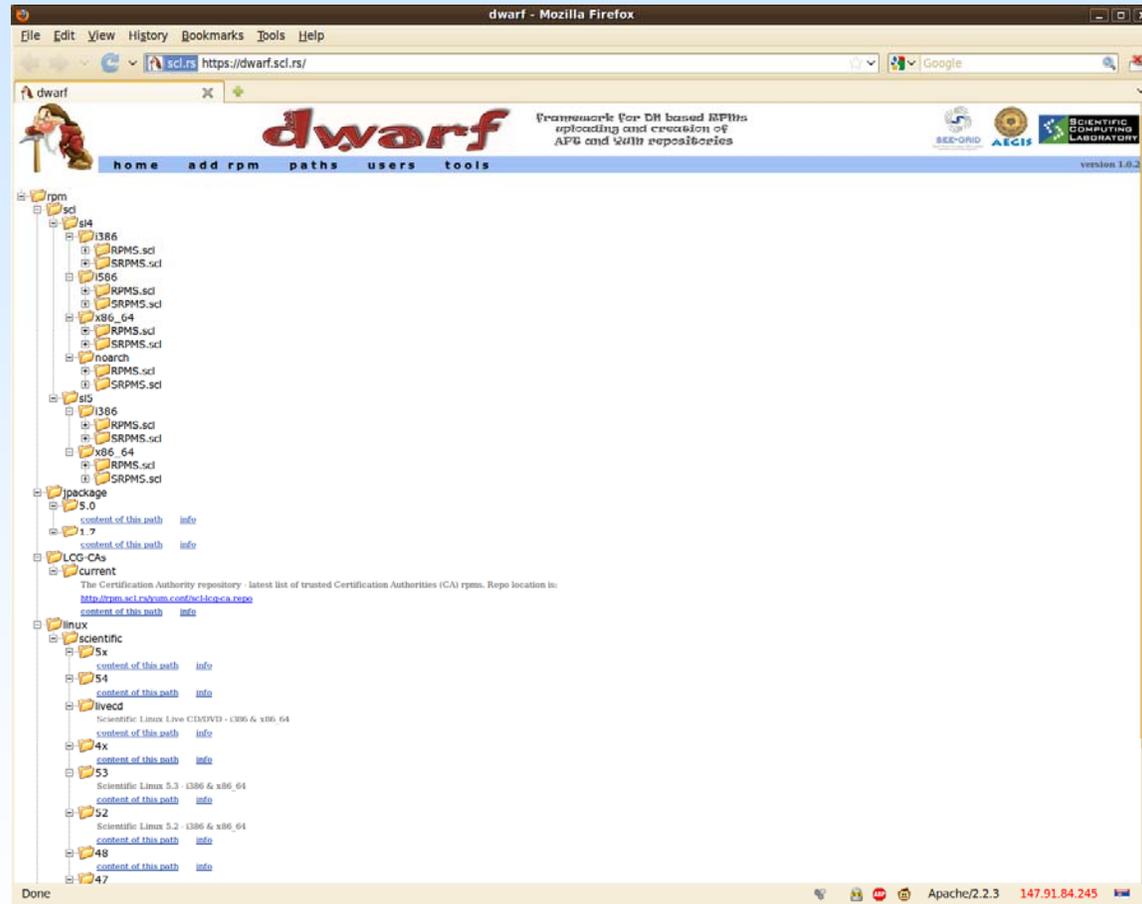
Dwarf architecture

- MIRROR DWARF module is responsible for mirroring some existing software repository locally (Scientific Linux, gLite software, community repositories (dag))
- Used in SEE-GRID-SCI

DWARF (3 / 3)



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DWARF web portal



- Prepares lists of LDAP URIs (Uniform Resource Identifiers) relevant for SEE (South Eastern Europe) Grid BDII instances
- LDAP URIs list is prepared using the information from GOCDDB, HGSM and static files
- Executed each hour on the regional top-level BDII `bdiipb.ac.rs`



- WMS processes are controlled by the system daemons
- Sometimes gLite service on WMS cannot be properly restarted, nor can be cleanly shut down
- scl-wms cleanly stops, starts and restarts all WMS-related daemons
- scl-wms script execution steps:
 - First uses the OS-level daemon stop command
 - Waits for some configurable amount of time
 - Checks for remaining processes owned by the glite user, and kills them
- The script accepts one of three possible options:
 - start
 - stop
 - restart

SCL-CLEAN-SCRATCH



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- It is possible to define the start folder for jobs other than user's home, and this folder is designated as a scratch
- Jobmanager occasionally fails to remove all job data from the scratch directory
- Piling up data in the scratch
- scl-clean-scratch is executed from the Computing Element on each WN
- Deletes all files and folders in each WN scratch directory owned by users other than those having currently running jobs on a given WN
- Uses node list from the installed scl-scripts set of scripts (scl-nodes)

SCL-GENERATE-POOL-ACCOUNTS



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- gLite installer YAIM uses a file users.conf to create pool of accounts for each Virtual Organization
- Easy generation of the users.conf file, and simplifies their maintenance for site administrators
- Script can be used whenever support for a new VO has to be added to a given Grid service
- User specifies :
 - VO name, base user ID (UID), group name, group ID (GUID), group size, prd size and sgm size

SCL-GENERATE-USERS



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- Easy creating of pool of accounts for users
- Useful for Grid training events and creating accounts on User Interface
- Generates users on Linux system and sets random passwords for each user
- Name for the pool and length of the initial set random password can be defined

SCL-NETWORK-SLEEP



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- In some cases network service is not operational immediately after the network daemon starts it
- Some system services that need network to operate properly cannot be started (e.g. NFS)
- Executed just after the network daemon
- Sleeps configurable amount of time to allow network adapter to establish network connectivity through the switch



- Provides data about the status of each node in cluster
- Collects CPU and motherboard temperature from the IPMI interface
- Gathers various information from the operating system interface to the underlying hardware devices
- Data are accessed and published by the http server
- Used within Cumulative Grid Monitoring Tool (CGMT) developed in SCL



- Extracts information about the running and waiting jobs from the jobmanager on specific Computing Element per VO
- Uses PBS commands to get information about running and waiting jobs on CE
- Takes into account running and waiting processes (not only jobs) – useful for MPI
- Integrated in CGMT

SCL-TESTS-STATUS



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- Designed to access SAM, BBSAM and GStat tools to get information about the Grid site services status
- Uses SAM Programmatic Interface (SAM PI) which allows access to SAM DB
- SAM firewall has be opened for the IP number of the host(s) that will execute the scl-tests-status script
- Integrated in CGMT

Conclusions



SEE-GRID-SCI
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- All presented tools and scripts are developed by SCL and used for various Grid operations of the two gLite-based sites at SCL
- Developed in order to:
 - Ease and simplify Grid operations and manual tasks that have to be performed on many nodes
 - Provide easier monitoring of the status of medium and large clusters
- Available for download from SCL's SVN and RPM repository